

CLAIMS

What is claimed is:

1. A method of adjusting the dynamics of an audio track, comprising:
 - deriving, from the audio track, a set of metadata describing a statistical distribution of levels encountered in the audio track;
 - deriving, from the metadata, a time-varying gain to modify the statistical distribution of levels; and
 - applying the time-varying gain to the audio track to obtain a resulting audio track.
2. The method of claim 1 wherein the step of deriving the time varying gain comprises:
 - specifying a desired statistical dynamics distribution;
 - deriving a transfer function from the metadata and from the desired statistical dynamics distribution; and
 - deriving the time-varying gain from the transfer function such that a final statistical dynamics distribution encountered in the resulting audio track is substantially similar to the desired statistical dynamics distribution.
3. The method of claim 1 wherein the step of deriving the time varying gain comprises:
 - specifying a desired overall loudness for the audio track;
 - deriving an estimate of the loudness of the resulting audio track from the metadata and from an initial estimate of the time-varying gain;
 - deriving a correction factor from the desired overall loudness and from the estimate of the loudness of the resulting audio track; and
 - applying the correction factor to the initial estimate of the time-varying gain to obtain the time-varying gain.
4. The method of claim 1 wherein the step of deriving the time varying gain comprises:
 - deriving, from histogram data of levels encountered in the audio track, an original

dynamic spread value representing a spread of the levels encountered in the audio track;
performing a comparison between the original dynamic spread value and a desired dynamic spread value; and
deriving parameters for the derivation of the time-varying gain from the comparison.

5. The method of claim 4 wherein the step of deriving parameters comprises:
determining a slope of a segment of a compressor transfer function.
6. The method of claim 5 wherein the step of determining the slope comprises:
applying a test compression scheme to the histogram data to obtain test histogram data, the test compression scheme including a test slope;
determining a test dynamic spread value from the test histogram data; and
deriving the slope based on a comparison of the original dynamic spread value, the desired dynamic spread value and the test dynamic spread value.
7. The method of claim 6 wherein the slope for the compressor transfer function is determined using interpolation.
8. The method of claim 6 wherein the slope for the compressor transfer function is determined using iteration.
9. The method of claim 4 wherein the original dynamic spread value is derived from a mean absolute deviation from a mean loudness value for the audio track.
10. The method of claim 4 wherein the original dynamic spread value is derived from a mean absolute deviation from a median loudness value for the audio track.
11. The method of claim 4 wherein the parameters include a level of a threshold separating two segments of a compressor transfer function.

12. The method of claim 4 further comprising:
 - specifying a fraction representing a proportion of the audio track to which compression will be applied;
 - deriving from the histogram data a loudness value corresponding to a point above or below which the fraction of the histogram data is located; and
 - using the loudness value as a threshold separating two segments of a compressor transfer function.
13. The method of claim 6 further comprising:
 - deriving a test overall loudness value from the test histogram data;
 - deriving a fixed post-gain value from the test overall loudness value and from a desired loudness value; and
 - applying the time varying gain and the fixed post-gain value to the audio track.
14. A method of adjusting the loudness of an audio track including a plurality of audio frames, the method comprising:
 - obtaining loudness values for each of the plurality of audio frames;
 - applying a weighting factor to each of the loudness values to obtain a plurality of weighted loudness values;
 - aggregating the weighted loudness values to obtain an overall loudness value for the audio track;
 - comparing the overall loudness value to a desired loudness value; and
 - applying a gain to the audio track based on the comparison between the overall loudness value and the desired loudness value.
15. The method of claim 14 wherein the weighting factor to be applied to a particular loudness value is derived from the particular loudness value itself.

16. The method of claim 15 wherein the weighting factor for a particular loudness value comprises an emphasis parameter raised to a power of the particular loudness value.
17. The method of claim 14 wherein the weighted loudness values of the plurality of audio frames are aggregated using a histogram.
18. A method of altering a dynamic range of an audio track comprising a plurality of audio frames each having a loudness value, the method comprising:
 - obtaining original statistical frequency data for the audio track;
 - applying a test compression scheme to the original statistical frequency data to obtain test statistical frequency data;
 - deriving from the original statistical frequency data and the test statistical frequency data an actual compression scheme; and
 - compressing the audio track using the actual compression scheme.
19. The method of claim 18 further comprising:
 - obtaining a mean loudness deviation value from the loudness values for the plurality of audio frames;
 - determining a test mean loudness deviation value from the test statistical frequency data; and
 - comparing the mean loudness deviation value and the test mean loudness deviation value with a desired mean loudness deviation value when deriving the actual compression scheme .
20. A method of processing an audio track comprising:
 - obtaining statistical frequency data for the audio track;
 - applying a compression scheme to the statistical frequency data to obtain an estimate of statistical frequency data that would result from applying the compression

scheme directly to the audio track;

determining an estimated overall compressed loudness value from the estimate of statistical frequency data;

compressing the audio track using the compression scheme to obtain a compressed audio track; and

applying a gain to the compressed audio track based on a comparison between the estimated overall compressed loudness value and a desired loudness value.

21. The method of claim 20 wherein the overall compressed loudness value is obtained by:

obtaining a plurality of individual loudness values from the estimate of statistical frequency data;

applying a weighting factor to each of the individual loudness values to obtain weighted loudness values; and

aggregating the weighted loudness values to obtain the overall compressed loudness value for the audio track.